

### AMENDMENT TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

#### Listing of Claims:

- 1-7. (Canceled)
8. (Currently Amended) A method for assessing feeding and/or weight gain pattern in a subject in need thereof, comprising measuring ~~at least two melanocortin~~ desacetyl- $\alpha$ -MSH and  $\alpha$ -MSH peptides in a sample obtained from said subject, calculating the desacetyl- $\alpha$ -MSH/ $\alpha$ -MSH ratio ~~of the measured melanocortin peptides~~, and comparing ~~the value of the~~ calculated ratio with a reference [[value]] ratio from a control, wherein an increase in the calculated desacetyl- $\alpha$ -MSH/ $\alpha$ -MSH ratio above the reference ratio is indicative of an imbalance in feeding and/or weight gain pattern in the subject.
9. (Currently Amended) A method for predicting risk of obesity in a subject in need thereof, comprising measuring ~~at least two melanocortin~~ desacetyl- $\alpha$ -MSH and  $\alpha$ -MSH peptides in a sample obtained from said subject, calculating the desacetyl- $\alpha$ -MSH/ $\alpha$ -MSH ratio ~~of the measured melanocortin peptides~~, and comparing ~~the value of the~~ calculated ratio with a reference [[value]] ratio from a control, wherein an increase in the calculated desacetyl- $\alpha$ -MSH/ $\alpha$ -MSH ratio above the reference ratio is predictive of increased risk of obesity in the subject.
10. (Currently Amended) A method for diagnosing obesity in a subject in need thereof, comprising measuring ~~at least two melanocortin~~ desacetyl- $\alpha$ -MSH and  $\alpha$ -MSH peptides in a sample obtained from said subject, calculating the desacetyl- $\alpha$ -MSH/ $\alpha$ -MSH ratio ~~of the measured melanocortin peptides~~, and comparing ~~the value of the~~ calculated ratio with a reference [[value]] ratio from a control, wherein an increase in the calculated desacetyl- $\alpha$ -MSH/ $\alpha$ -MSH ratio above the reference ratio is diagnostic of obesity in the subject.
11. (Currently Amended) A method for diagnosing imbalance in energy homeostasis in a subject in need thereof, comprising measuring ~~at least two melanocortin~~ desacetyl-

$\alpha$ -MSH and  $\alpha$ -MSH peptides in a sample obtained from said subject, calculating the desacetyl- $\alpha$ -MSH/ $\alpha$ -MSH ratio of the measured melanocortin peptides, and comparing the value of the calculated ratio with a reference [[value]] ratio from a control, wherein an increase in the calculated desacetyl- $\alpha$ -MSH/ $\alpha$ -MSH ratio above the reference ratio is diagnostic of an imbalance in energy homeostasis in the subject.

12-14. (Canceled)

15. (Currently Amended) A method according to any one of claims 8-11 [[8-13]], wherein the ~~melanocortin~~ desacetyl- $\alpha$ -MSH and  $\alpha$ -MSH peptides are measured by a biological response system capable of predicting the risk of developing obesity, or diagnostic of obesity, imbalance in energy homeostasis or disturbance in feeding/weight gain patterns, and wherein the resulting profile of response parameters is predictive of the risk of developing obesity or diagnostic of obesity, imbalance in energy homeostasis or disturbance in feeding/weight gain patterns.
16. (Currently Amended) A method of assessing risk of developing obesity, diagnosing obesity or diagnosing an imbalance in energy homeostasis or disturbance in feeding/weight gain patterns in a subject in need thereof, comprising:
- measuring the amount of  $\alpha$ -MSH and desacetyl- $\alpha$ -MSH in a sample obtained from the subject, either directly or by subtraction of one of the amount of  $\alpha$ -MSH or desacetyl- $\alpha$ -MSH from a measured amount of total MSH in the sample,
  - calculating the ratio of the amounts of desacetyl- $\alpha$ -MSH to  $\alpha$ -MSH.
  - comparing the calculated ratio of desacetyl- $\alpha$ -MSH to  $\alpha$ -MSH with a reference ratio from a control,
- wherein an increase in the calculated desacetyl- $\alpha$ -MSH/ $\alpha$ -MSH ratio above the reference ratio is indicative of the subject being at risk of development of obesity, diagnostic of obesity or diagnostic of an imbalance in energy homeostasis or disturbance in feeding/weight gain patterns.
17. (Currently Amended) A method according to any one of claims 8-11 [[8-13]] and 16, wherein the measurement is quantitative.

18. **(Currently Amended)** A method according to any one of claims 8-11 and 16 [[claim 14]], wherein  $\alpha$ -MSH and desacetyl- $\alpha$ -MSH are separated from the sample before measurement.
19. **(Original)** A method according to claim 18, wherein  $\alpha$ -MSH and desacetyl- $\alpha$ -MSH are separated by a procedure selected from the group consisting of chromatography, electrophoresis, immunocapture and affinity capture.
20. **(Currently Amended)** A method according to any one of claims 8-11 [[8-13]] and 16, wherein ~~the melanocortin peptide~~,  $\alpha$ -MSH or desacetyl- $\alpha$ -MSH is measured by an immuno-assay.
- 21-22. **(Canceled)**
23. **(Currently Amended)** A method according to any one of claims 8-11 [[8-13]] and 16, wherein the subject is a mammal.
24. **(Canceled)**
25. **(Currently Amended)** A method according to any one of claims 8-11 [[8-13]] and 16, wherein the sample is a biological fluid selected from the group consisting of whole blood, plasma, serum, saliva, sweat, urine, amniotic fluid, cord blood and cerebrospinal fluid.
- 26-28. **(Canceled)**
29. **(Currently Amended)** A method according to claim 15, wherein the biological response system is an *in vitro* cell, organ or tissue sample, or whole animal capable of responding to desacetyl- $\alpha$ -MSH and  $\alpha$ -MSH ~~melanocortin~~ peptides.
30. **(Original)** A method according to claim 29, wherein the *in vitro* cell is selected from the group consisting of primary osteoblasts, osteosarcoma cell line, hypothalamic cell line, adipocytes, myocytes, melanoma cells and anterior pituitary cells.
31. **(Original)** A method according to claim 29, wherein the organ or tissue sample is that of hypothalamus.
32. **(Previously Presented)** A method according to claim 15, wherein the profile of response parameters measured comprise one or more proteins or cellular events which differentiate between normal subjects and those at risk of developing obesity or

having obesity, or those with an imbalance in energy homeostasis, or disturbance in feeding/weight gain patterns.

33. **(Currently Amended)** A method according to claim 32, wherein the one or more proteins are selected from the group consisting of heat shock protein homologue, glyceraldehyde-3-phosphate-dehydrogenase, aldo-keto reductase, citrate synthase, creatine kinase, pyruvate synthase alpha-chain, f1 ATPase beta-chain, tubulin beta-chain, proteins involved in the melanocortin peptidergic axis, proteins involved in signaling [[signalling]] pathways and membrane-bound proteins.
34. **(Canceled)**
35. **(New)** The method of any one of claims 8-11 and 16, wherein the control is a sex and age matched control.